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A NEW METHOD OF PRESERVING SPECIMENS OF SHELL AND OTHER PERISHABLE MATERIALS¹

By PHILIP MILLS JONES

While conducting some archeological researches for Mrs Phoebe A. Hearst, in behalf of the University of California, I visited Santa Rosa island off the coast of California at the vicinity of Santa Barbara, during the early months of 1901. Here the conditions of climate and food supply were particularly favorable to the struggle for existence, and the existing remains indicate not only a fairly large aboriginal population, but also a rather unusual dexterity in the fashioning of articles of adornment. A considerable variety of shell-fish furnished the raw material, but while some fifty varieties have been noted, the great majority of decorative objects were made from the shells of the very abundant abalone, or *Haliotis refusens*. The village sites and graveyards of Santa Rosa island were particularly rich in this shell material, and much of it exhibits a high degree of skill in shaping as well as in ornamentation.

Every collector has doubtless experienced the very disagreeable sensation of procuring some particularly prized shell specimens from a moist soil, only to see them disintegrate with the passage of time and the loss of the contained moisture. The long retention of the specimens in more or less wet soil results in the removal of practically all the cementing material that normally holds together the lamellæ of calcareous matter. As a result of this dehydration, when the specimens become dry the slightest touch brushes away particles, and even when untouched and in a glass case they not infrequently drop apart and eventually leave only a small heap of powder.

To counteract this effect two requirements are to be met by the collector: immediate preservation for transportation to the museum, and the permanent fixation at some subsequent time. The first of these I found well satisfied by allowing the specimens to remain, until

¹ Read at the meeting of the American Anthropological Association, San Francisco, August 30.

nearly dry, in some of the soil in which they had been buried, and then packing them in plenty of cotton in comparatively small boxes, always refraining from unnecessary manipulation or attempts at cleaning.

To permanently preserve the objects, however, is a far more difficult matter. Two methods have previously been recommended, and, presumably, exclusively employed. Shellac has had rather the larger number of supporters, but it is not effectual, as it furnishes merely an outside skin and does not materially strengthen very weak specimens; moreover, it gives the specimen a glossy and refractive surface which imparts an unnatural appearance. Boiling in oil has been used by some, but this is out of the question when fragile specimens are to be preserved, and it has the disadvantage of the shellac in that it gives the shell an unnatural appearance.

On studying the problem it seemed evident that as an animal cementing substance had been removed from the entire mass of the shell, it should be replaced by a substance of similar character if the restoration of the specimen is to be effected. The following method was therefore devised, and by it several thousands of specimens were successfully treated. After two years the objects are as sound and strong as when first treated, and have all the appearance of perfectly natural shell.

A solution of clear gelatin, such as is used for bacteriologic cultures, of about three percent to four percent strength, is kept fluid over a sand bath and Bunsen burner. Into this the specimens are placed and allowed to remain until about one minute after all bubbles of air have ceased. While in the gelatin the specimens may be thoroughly cleaned with a camel's hair brush. They are then removed and placed in a vessel containing ordinary commercial formalin solution, or formaldehyde, where they are allowed to remain for a few moments, or at the convenience of the operator, and are then removed, drained, and allowed to dry slowly.

In this process the cementing material is furnished by the gelatin, and the formalin acts upon the gelatin, making "formalin-gelatin," an insoluble substance. Thus the shell is impregnated with an animal cementing material and at the same time protected by an absolutely insoluble coating.